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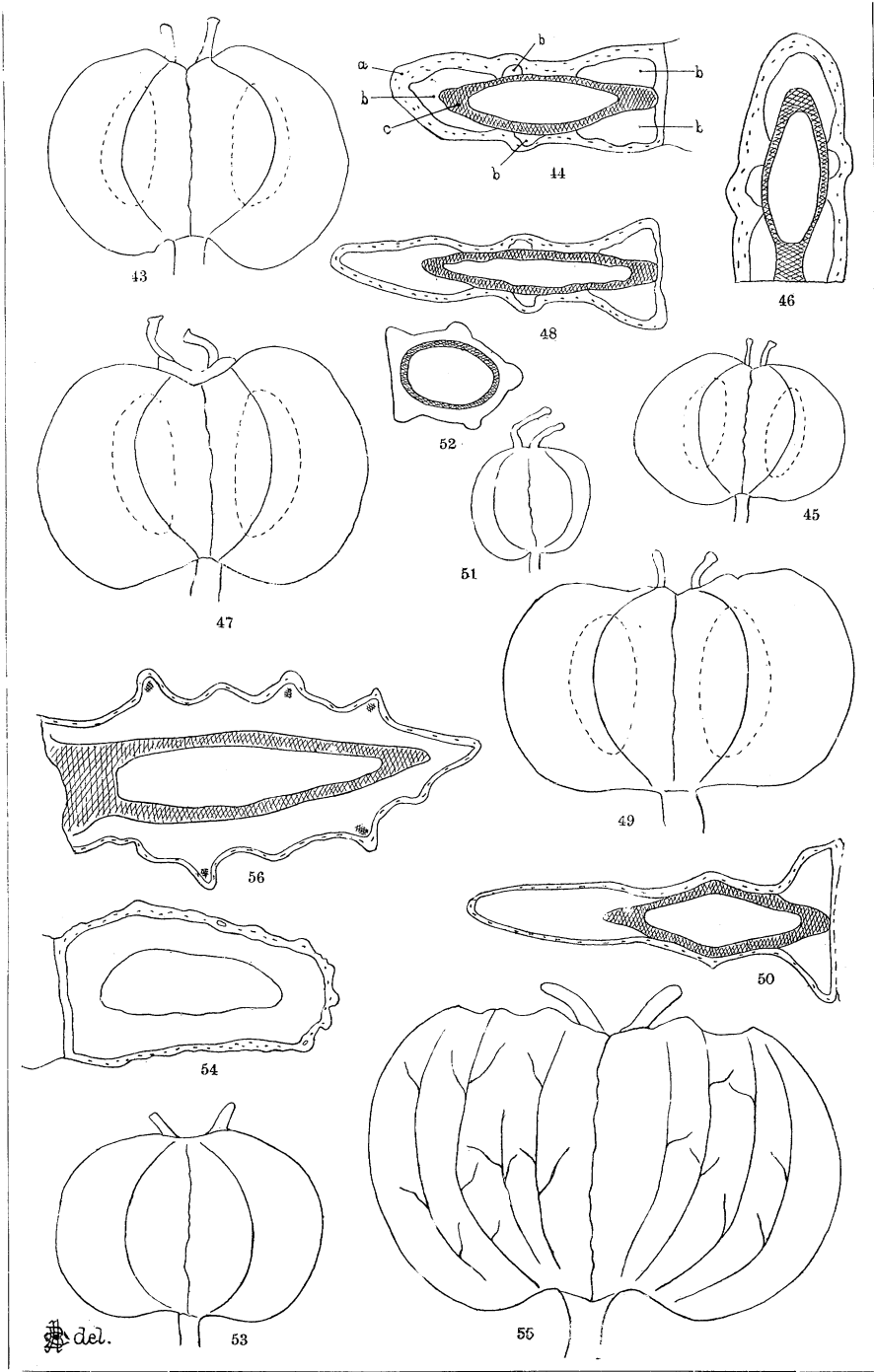
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COULTER and ROSE on UMBELLIFERÆ.

Notes on Umbelliferae of E. United States. IV.

JOHN M. COULTER AND J. N. ROSE.

(WITH PLATE IV.)

HYDROCOTYLE Tourn.—Fruit (and carpels) strongly flattened laterally, more or less orbicular: carpel with 5 primary ribs (additional secondary ones with reticulations in a single species); dorsal ribs marginal, broad or filiform; intermediate ribs filiform (rarely obsolete), usually curved; lateral ribs filiform or broad, distinct or confluent: a prominent oil-bearing layer beneath the epidermis (except in *H. Americana*), occasionally containing small oil ducts¹: a thick layer of strengthening cells surrounding the seed cavity (except in *H. ranunculoides*) (figs. 43-56).—Low herbaceous perennials, growing in or near water, with slender creeping stems, orbicular-peltate or reniform leaves, and small white flowers in simple or proliferous umbels. Flowering all summer. In figure 44, *a* indicates the oil-bearing layer, *b* ordinary parenchyma, *c* the layer of strengthening cells.

* Fruit with pericarp thin except at the broad thick corky dorsal and lateral ribs (figures 48-50): leaves orbicular-peltate, crenate: peduncles as long as petioles, all from slender creeping rootstocks.

+- Fruit notched² at base and apex; intermediate ribs corky (figures 43-48).

1. *H. umbellata* L. Spec. 234. Umbels many-flowered, simple (sometimes proliferous): pedicels 2 to 6 lines long: fruit about $1\frac{1}{2}$ lines broad, strongly notched (figs. 43, 44).—Massachusetts to Minnesota and southward to the Gulf.

2. *H. prolifera* Kellogg, Proc. Calif. Acad. i. 15. Umbels mostly proliferous, with 5 to 20-flowered whorls: pedicels 1 to 3 lines long: fruit about a line broad, but slightly notched (figs. 45, 46).—Texas, to Arizona and California. This species is too near *H. umbellata*. In the great majority of specimens they can be distinguished easily, but the occasional forms of *H. prolifera* which are not proliferous, and

¹This character of a prominent oil-bearing layer differs from any other group yet studied. In the European *H. vulgaris* the oil-bearing layer breaks through the epidermis in places covering the fruit with oil vesicles.

²This notching may not be apparent except in fully matured fruit.

with many flowers and long pedicels, can be distinguished with difficulty. The fruit sections are but slightly different. If this is a good species, the following is a better one.

3. *H. Canbyi*. Umbels 3 to 9-flowered, generally proliforous: pedicels very short, but distinct: fruit about 2 lines broad; carpels broader and more flattened than in the preceding forms, sharper margined, dorsal and lateral ribs much more prominent; seed-section much narrower (figs. 47, 48). *H. umbellata* var? *ambigua* Gray, Manual, 190.—New Jersey to Maryland. It would be proper to call this species *H. ambigua*, but that name already has a place among the synonyms of *Erigenia bulbosa*.

The three foregoing species, with *H. vulgaris* of Europe, form a very natural group, closely resembling each other in the anatomical details of the fruit. *H. vulgaris* is most nearly related in external appearance to *H. Canbyi*, but differs in its smaller fruit more or less dotted with oil vesicles, its less flattened carpels, and less prominent dorsal and lateral ribs, thus intermediating between *H. Canbyi* and the first two species. There can be no doubt but that our three species are the North American representatives of *H. vulgaris*.

+—Fruit not notched; intermediate ribs not corky (figs. 49, 50).

4. *H. interrupta* Muhl. Cat. 10. Umbels few-flowered, proliforous, forming an interrupted spike: pedicels very short or none: fruit $1\frac{1}{2}$ to 2 lines broad; dorsal and lateral ribs very prominent (figs. 49, 50).—Massachusetts to Florida and Texas; also in Utah.

* * Fruit with pericarp uniformly corky thickened and ribs all filiform (figs. 51-56): leaves not peltate: peduncles much shorter than petioles.

+—Fruit small ($\frac{3}{4}$ to $1\frac{1}{2}$ lines broad), without secondary ribs or reticulations: involucre bracts small or wanting.

5. *H. Americana* L. Spec. 234. Stems filiform, branching and creeping: leaves thin, round-reniform, crenate-lobed and lobes crenate, shining: few-flowered umbels axillary and almost sessile: fruit less than a line broad; intermediate ribs prominent; no oil-bearing layer; seed-section broadly oval (figs. 51, 52).—Throughout the North and southward to North Carolina.

6. *H. ranunculoides* L. f. Suppl. 77. Usually floating: leaves thicker, round-reniform, 3 to 7-cleft lobes crenate: peduncles 1 to 3 inches long, reflexed in fruit: capitate umbel

5 to 10-flowered: fruit 1 to $1\frac{1}{2}$ lines broad; ribs rather obscure; no layer of strengthening cells about seed cavity; seed-section oblong (figs. 53, 54).—E. Pennsylvania to Florida, thence westward to Texas and California.

+-Fruit larger, with prominent secondary ribs and reticulations: the 2 to 4-flowered umbel subtended by an involucre of two conspicuous bracts.

7. *H. Asiatica* L. Spec. 234. Petioles and peduncles (1 to 2 inches long) clustered on creeping stems or runners: leaves ovate-cordate, repand-toothed, thickish: fruit about 2 lines broad seed-section narrowly oblong (figs. 55, 56). *H. repanda* Pers., Benth in Fl. Austral. iii. 347.—Maryland to Florida and westward.

EXPLANATION OF PLATE IV.—All surface views are $\times 15$; all transverse sections are $\times 27$.

Fertilization of *Epipactis latifolia*.

A. D. WEBSTER.

[It is not our custom to reprint articles, but a good contributor has made request for the following, on the plea of its interest, and the comparative inaccessibility of the original publication. It appears in the *Transactions and Proceedings of the Botanical Society* of Edinburgh, vol. xvi, part iii, 1886. The author is of Llandegai, Penrhyn.—Eds.]

Having during the past few years, but particularly the summer of 1885, devoted considerable attention to the above interesting subject, I have thought the following observations not unworthy of record, as contributing to a subject which, as yet, has received little investigation. In the woodlands of this county (Carnarvonshire), where the plant grows in unusual quantity, exceptional opportunities have been afforded me of studying it under various conditions as to soil, altitude, and situation.

All, or nearly all my observations tend to show (1) that *Epipactis latifolia* is very imperfectly fertilized; (2) that, although visited by insects, cross-fertilization seldom takes place; and (3) that self-fertilization by the pollen falling spontaneously on the stigma is not uncommon.

1. That the plant is very imperfectly fertilized is evident from the small quantity of seed produced. On examining